NORTH CAROLINA OFFICE OF EMERGENCY MEDICAL SERVICES

DIVISION OF FACILITY SERVICES • DEPARTMENT OF HEALTH & HUMAN SERVICES

Anatomy & Physiology Course Objectives

These educational objectives are taken from Appendix E of the 1998 Release of the United Stated Department of Transportation (US DOT) National Highway Traffic Safety Administration (NHTSA) EMT-Paramedic Course: National Standard Curriculum. These objectives may be offered separately from the EMT-Paramedic educational program or may be incorporated into the lesson objectives for the appropriate didactic sessions.

Whether the objectives are met through a separate course or in conjunction with the EMT-Paramedic program and incorporated into the lesson objectives, the instructor for this material must have at a minimum an Associate Degree and have successfully completed at least two college semesters of anatomy and physiology.

The following list of objectives have been derived from many of the currently available resources in anatomy and physiology instruction that are typically part of allied health educational programs or other non-science curricula. The objectives that are listed below are in common with most of these programs. Paramedic education program should select courses or textbooks that cover this level of material.

OBJECTIVES:

1. Define anatomy, physiology, and pathophysiology
2. Name the levels of organization of the body and explain each
3. Name the organ systems of the body
4. Define homeostasis and give an example of a typical homeostatic mechanism
5. Describe the anatomical position
6. Describe the sagittal, midsagittal, transverse and frontal planes
7. Use proper terminology to describe the location of body parts with respect to one another
8. Name the body cavities, their membranes and some organs within each cavity
9. Explain the four quadrants of the abdomen and name the organs in those areas
10. Define matter, element, atom, proton, neutron, and electron
11. Using symbols, name some common elements found in the body
12. Describe the purpose of ionic, covalent and hydrogen bonds in the body
13. Describe what happens in synthesis and decomposition reactions
14. Explain the importance of water to the function of the body
15. Describe where water is found in the body
16. Explain the roles of oxygen and carbon dioxide in cell respiration
17. Explain pH and state normal pH ranges in body fluids
18. Explain how a buffer system resists major pH changes
19. Describe the functions and types of sugars, fats, and proteins
20. Explain how enzymes function as catalysts
21. Describe the function of DNA, RNA and ATP
22. Name the organic molecules that make up the cell membrane and state their functions
23. State the arrangement of the molecules in the cell membrane
24. State the five functions of proteins in the cell membrane
25. Describe the cytoplasm
26. Describe how the cell membrane regulates the composition of the cytoplasm
27. Explain isotonic, hypotonic, and hypertonic solutions and their effects on the cell
28. State the function of the nucleus and chromosomes
29. Describe the function of the cell organelles
30. Define each of these cellular transport mechanisms and give an example of the role of each in the body: diffusion, osmosis, facilitated diffusion, active transport, filtration, phagocytosis and pinocytosis
31. Describe what happens in mitosis and meiosis and describe the importance of each
32. Describe the four major categories of tissues and give general characteristics of each
33. Describe the function of epithelial tissue depending on their location
34. Describe the functions of connective tissue and relate them to the function of the body or an organ system
35. Explain the basic differences between smooth, skeletal and cardiac muscle
36. Describe in brief nervous tissue
37. Name the organs made of nerve tissue
38. Describe the location of pleural membranes, pericardial membranes, and the perineum-mesentery
39. State the location of mucous membranes and state the function of mucus

40. Name some membranes made of connective tissue
41. State the three functions of the integumentary system
42. Name the two layers of skin
43. State the location and function of the stratum corneum and the stratum germinativum
44. Describe the function of melanocytes and melanin
45. Describe the function of hair and nails
46. Describe the functions of the secretions of sebaceous glands, ceruminous glands and eccrine sweat glands
47. Describe how the arterioles in the dermis respond to heat, cold, and stress
48. Name the tissues that make up the subcutaneous tissue and describe their functions
49. Describe the function of the skeleton
50. Explain how bones are classified and give an example of each
51. Describe how the embryonic skeleton is replaced by bone
52. State the nutrients necessary for bone growth
53. Name the hormones involved in bone growth and maintenance
54. Explain what is meant by exercise for bones and explain its importance
55. Identify the two major subdivisions of the skeleton and list the bones in each area
56. Explain how joints are classified; give an example of each and describe the movements possible
57. Describe the parts of a synovial joint and explain their function
58. Describe muscle structure in terms of muscle cells, tendons and bones
59. Describe the difference between antagonistic and synergistic muscles
60. Name the energy sources for muscle contraction and state the simple equation for cell respiration
61. Explain the importance of hemoglobin and myoglobin and oxygen debt and lactic acid
62. Describe the neuromuscular junction and explain the function for each part
63. Describe the structure of a sarcomere
64. Explain polarization, depolarization and repolarization in terms of ions and charges
65. Describe the sliding filament theory of muscle contraction
66. State the major muscles of the body and their functions
67. Name the divisions of the nervous system and state the general functions of each
68. Name the parts of a neuron and the function of each
69. Explain the importance of Schwann cells in the peripheral nervous system and neuroglia in the central nervous system
70. Describe the electrical nerve impulse and impulse transmission at the synapse
71. Describe the types of neurons, nerves and nerve tracts
72. Explain the importance of stretch reflexes and flexor reflexes
73. Describe the reflex arc
74. State the functions of the parts of the brain and locate each part on a diagram
75. Name the meninges and describe their locations
76. State the locations and functions of cerebrospinal fluid
77. Explain the general purpose of sensations
78. Name the parts of the sensory pathway and the general functions of each part
79. Describe the characteristics of sensations
80. Name the cutaneous senses and explain their purpose
81. Explain referred pain and explain its importance
82. Explain the importance of proprioception, or muscle sense
83. Describe the pathways for the senses of smell and taste and explain how these senses are interrelated
84. Name the parts of the eye and explain their function in sight
85. Name the parts of the ear and explain their function in hearing
86. Describe the physiology of equilibrium

87. Distinguish between endocrine and exocrine glands
88. Define hormone and prostaglandin
89. Identify the primary endocrine glands and list the major hormones secreted by each
90. Explain the roles of positive and negative feedback mechanisms in hormone secretions
91. Describe the relationship between parathyroid hormone and calcitonin
92. Describe the relationship between insulin and glucagon
93. Explain what prostaglandins are made of and state some of their functions
94. Explain how protein hormones are believed to exert their effects
95. Explain how steroid hormones are believed to exert their effects
96. Describe the primary functions of blood
97. List the formed elements of blood and state the primary functions of each
98. Name the hemopoietic tissues and the kinds of blood cells each produces
99. Describe what happens to red blood cells at the end of their life span including the fate of hemoglobin
100. Explain the ABO and Rh blood types
101. Name the five kinds of white blood cells and the functions of each
102. State what platelets are and explain how they are involved in hemostasis
103. Describe the three stages of blood clotting
104. Explain how abnormal clotting is prevented in the vascular system
105. Describe the location of the heart in terms of body cavities and relationship to other structures
106. Name the chambers of the heart and the vessels that enter or leave each
107. State the valves of the heart and their function
108. State how heart sounds are created
109. Trace the pathway of a blood cell throughout the body
110. Describe coronary circulation
111. Describe the cardiac conduction pathway and its relationship to a normal electrocardiogram
112. Explain stroke volume, cardiac output and Starling's law of the heart
113. Explain how the nervous system regulates the function of the heart
114. Describe the structure and function of each of the blood vessels: arteries, veins and capillaries
115. Describe the exchange of gases that occur at the capillary level
116. Name the major systemic arteries and the parts of the body they nourish
117. Name the major systemic veins and the parts of the body they drain of blood
118. Define blood pressure and state the normal ranges for the systolic and diastolic indices
119. Describe the functions of the lymphatic system
120. State how lymph is formed
121. Describe the system of lymph vessels and explain how lymph is returned to the blood
122. State the location and function of lymph nodules and nodes
123. State the location and function of the spleen
124. Define immunity
125. Explain the role of the thymus in immunity
126. Explain the differences between humoral immunity and cell mediated immunity
127. Compare and contrast the development and function of B cells and T cells
128. Describe the differences between acquired immunity and genetic immunity
129. Explain how vaccines work
130. State the general function of the respiratory system
131. State the pathway of the respiratory system including nasal cavities, pharynx and larynx
132. State the function of the turbinates in the nasal cavity
133. Describe the structure and function of the larynx and the speaking mechanism
134. State the roles of the visceral and parietal pleura in respiration
135. State the changes in air pressure within the thoracic cavity during respiration

136. Explain the diffusion of gases in external and internal respiration
137. Describe how oxygen and carbon dioxide are transported in the blood
138. Explain the nervous and chemical mechanisms that regulate respiration
139. Explain how respiration affects the pH of certain body fluids
140. Describe the general function of the digestive system and name the major divisions
141. Identify the accessory organs of digestion
142. Explain the difference between mechanical and chemical digestion
143. Describe the structure and function of the teeth and tongue
144. Explain the function of saliva
145. Describe the location and function of the pharynx and esophagus
146. List and describe the four layers of the alimentary canal
147. Describe the difference in absorption between the large and small intestine
148. Describe the function of the normal flora in the colon
149. Define peristalsis
150. Define chyme
151. State the normal range of body temperature
152. Define metabolism, catabolism and anabolism
153. State the different ways heat is generated and lost in the body
154. State why the hypothalamus is the thermostat of the body
155. State what the products of cell respiration are and how the body disposes of them
156. Describe the metabolic roles of fats, glucose and proteins
157. Describe basal metabolic rate and the factors that affect it
158. Define kilocalories
159. Describe the water compartments and the name for the water in each
160. Explain how water moves between the compartments
161. Explain how water is taken in by the body and exits the body
162. Describe the location and general function of each organ in the urinary system
163. Name the parts of a nephron
164. Define glomerular filtration rate
165. Describe how the kidneys function in maintaining normal blood volume and pressure
166. Describe how the kidneys help to maintain normal blood pH and electrolyte balance
167. State the hormones that affect kidney function
168. Explain the interaction between capillary blood pressure and blood proteins
169. Describe the characteristics of normal urine
170. Define diploid and haploid
171. Describe the difference between spermatogenesis and oogenesis
172. Define gametes
173. Name the hormones necessary for the formation of gametes
174. List the essential and accessory organs of the male and female, give the general function of each
175. Identify and describe the structures that constitute external genitals in both sexes
176. Name the parts of a sperm cell
177. Define endometrium
178. Briefly describe the life cycle of an oocyte
179. Describe the menstrual cycle in terms of change sin hormone levels and the condition of the endometrium
180. Beginning with fertilization, describe the major developmental changes during gestation
181. Describe the structure and function of the placenta and umbilical cord
182. Describe the difference between fetal circulation/respiration and adult circulation/respiration
183. State the length of an average gestation period
184. Describe the states of labor

185. Describe the major changes that take place in an infant at birth
186. Explain how microorganisms are named and classified
187. Describe the distribution of and the benefits of normal flora
188. Explain what is meant by infectious disease
189. Describe the different methods by which infectious diseases are spread
190. List some important infectious diseases
191. Define genetic disease
192. Explain how genes can cause disease
193. Define homologous chromosomes, autosomes, sex chromosomes and genes
194. Define alleles, genotype, phenotype, homozygous, and heterozygous
195. Discuss the difference between dominant and recessive traits
196. List some important genetic diseases

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